

IN THE CLAIMS:

- Al
- 1 1. (Currently Amended) A system for replay of a backup memory in a storage sys-
2 tem having a file system for managing transfer of data to and from an attached disk array,
3 the system comprising:
4 a log in the backup memory containing the storage system transaction entries ac-
5 cumulated after a consistency point at which time results of the storage system transac-
6 tion entries are committed to the disk array;
7 an initiator process that establishes a swarm of messages with respect to the stor-
8 age system transaction ~~request~~ entries and delivers the swarm to the file system; and
9 a disk information-retrieval process in the file system that is carried out on the
10 swarm of messages in parallel.
- 1 2. (Original) The system as set forth in claim 1 wherein each of the messages of the
2 swarm is identified by a transaction block including a pointer to one of the transaction
3 request entries in the log, respectively, and a state that indicates whether each of the mes-
4 sages is one of (a) newly transferred to the file system, (b) subject to completion of a
5 LOAD phase thereon by the disk information-retrieval process, (c) subject to completion
6 of a MODIFY phase thereon by a MODIFY process of the file system or (d) incapable of
7 being subject to the LOAD phase until a prerequisite event occurs.
- 1 3. (Original) The system as set forth in claim 2 wherein the prerequisite event is com-
2 pletion of the LOAD phase and a MODIFY phase with respect to another of the mes-
3 sages.
- 1 4. (Original) The system as set forth in claim 3 wherein the initiator process is adapted
2 to retransfer each of the messages incapable of being subject to a load phase until the pre-

3 requisite event occurs to the file system for completion of the LOAD phase after the pre-
4 requisite event occurs, respectively.

1 5. (Original) The system as set forth in claim 4 wherein the initiator is adapted to estab-
2 lish a skip state with respect to skipped messages for which a portion of the disk array
3 associated therewith is unavailable, the skip state thereby omitting the skipped messages
4 from the swarm.

1 6. (Original) The system as set forth in claim 4 wherein the file system includes a panic
2 state adapted to alert an operator if a first message received from the initiator in the
3 swarm is a message incapable of being subject to a load phase until a prerequisite event
4 occurs.

1 7. (Original) The system as set forth in claim 4 wherein the file system includes a panic
2 state adapted to alert an operator if a message retransferred by the initiator process is a
3 message incapable of being subject to a load phase until a prerequisite event occurs.

1 8. (Original) The system as set forth in claim 1 wherein the backup memory comprises
2 a non-volatile random access memory (NVRAM).

1 9. (Original) The system as set forth in claim 1 wherein the storage system comprises a
2 network storage appliance.

1 10. (Original) A method for replay of a backup memory in a storage system having a file
2 system for managing transfer of data to and from an attached disk array, the method
3 comprising:

4 accumulating, in a log in the backup memory, storage system transaction request
5 entries after a consistency point at which time results of the transaction request entries are
6 committed to the disk array;

7 establishing a swarm of messages with respect to the transaction request entries
8 and delivering the swarm to the file system; and
9 performing a disk information-retrieval process of the file system on the swarm of
10 messages in parallel.

1 11. (Original) The method as set forth in claim 10 further comprising establishing, for
2 each of the messages of the swarm, a transaction block including a pointer to one of the
3 transaction request entries in the log, respectively, and a state that indicates whether each
4 of the messages is one of (a) newly transferred to the file system, (b) subject to comple-
5 tion of a LOAD phase thereon by the disk information-retrieval process, (c) subject to
6 completion of a MODIFY phase thereon by a MODIFY process of the file system or (d)
7 incapable of being subject to the LOAD phase until a prerequisite event occurs.

1 12. (Original) The method as set forth in claim 11 wherein the prerequisite event is com-
2 pletion of the LOAD phase and a MODIFY phase with respect to another of the mes-
3 sages.

1 13. (Original) The method as set forth in claim 12 further comprising retransferring each
2 of the messages incapable of being subject to a load phase until the prerequisite event oc-
3 curs to the file system for completion of the LOAD phase after the prerequisite event oc-
4 curs, respectively.

1 14. (Original) The method as set forth in claim 10 wherein the storage system comprises
2 a network storage appliance.

1 15. (Original) A computer-readable medium including program instructions executing on
2 a computer for parallelized replay of a backup memory in a storage system having a file
3 system for managing transfer of data to and from an attached disk array, the program in-
4 structions performing the steps of:

5 accumulating, in a log in the backup memory, storage system transaction request
6 entries after a consistency point at which results of the transaction request entries are
7 committed to the disk array;
8 establishing a swarm of messages with respect to the transaction request entries
9 and delivering the swarm to the file system; and
10 performing a disk information-retrieval process of the file system on the swarm of
11 messages in parallel.

11 16. (Original) The computer-readable medium as set forth in claim 15 further comprising
1 establishing, for each of the messages of the swarm, a transaction block including a
2 pointer to one of the transaction request entries in the log, respectively, in the log and a
3 state that indicates whether each of the messages is one of (a) newly transferred to the file
4 system, (b) subject to completion of the LOAD phase thereon by the disk information-
5 retrieval process, (c) subject to completion of a MODIFY phase thereon by a MODIFY
6 process of the file system or (d) incapable of being subject to the LOAD phase until a
7 prerequisite event occurs.
8

1 17. (Original) The computer-readable medium as set forth in claim 16 wherein the pre-
2 requisite event is completion of the LOAD phase and a MODIFY phase with respect to
3 another of the messages.

1 18. (Original) The computer-readable medium as set forth in claim 17 further comprising
2 retransferring each of the messages incapable of being subject to a load phase until the
3 prerequisite event occurs to the file system for completion of the LOAD phase after the
4 prerequisite event occurs, respectively.

1 19. (Original) The computer-readable medium as set forth in claim 15 wherein the stor-
2 age system comprises a network storage appliance.